UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2003/00676

September 2, 2003

Linda Goodman
Regional Forester
USDA Forest Service - Region 6
P.O. Box 3623
Portland, OR 97208-3623

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for U.S. Forest Service Programmatic Culvert Replacement Activities in Washington and Eastern Oregon

Dear Ms. Goodman:

Enclosed is a biological opinion (Opinion) prepared by the National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of culvert replacement to improve fish passage by the U.S. Forest Service in the State of Washington and in Eastern Oregon. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Lower Columbia River chinook salmon (*Oncorhynchus tshawytscha*), Upper Columbia River spring-run chinook salmon, Puget Sound chinook salmon, Snake River fall-run chinook salmon, Snake River spring/summer-run chinook salmon, Columbia River chum salmon (*O. keta*), Hood Canal summer-run chum salmon, Lower Columbia River steelhead (*O. mykiss*), Middle Columbia River steelhead, Upper Columbia River steelhead, and Snake River Basin steelhead or adversely modify designated critical habitat. As required by section 7 of the ESA, NOAA Fisheries has included reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize incidental take associated with this action.

This document also serves as consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations at 50 CFR Part 600. In this consultation, NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for Pacific salmon. NOAA Fisheries has included conservation recommendations to avoid, minimize, or otherwise offset affects to designated EFH produced by this project.

If you have questions regarding this consultation, please contact Dan Guy or Jim Turner of my staff at 360.534.9342 or 503.230.5419, respectively.

Sincerely,

For Michael R Crouse

D. Robert Lohn
Regional Administrator

Endangered Species Act - Section 7 Consultation
Biological Opinion

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Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Programmatic Culvert Replacement Activities in Washington and Eastern Oregon

Agency: U.S. Forest Service

Consultation Conducted By: National Marine Fisheries Service, Northwest Region

Date Issued: September 2, 2003

Issued by: For Michael R Crouse
D. Robert Lohn
Regional Administrator

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TABLE OF CONTENTS

1. INTRODUCTION

The U.S. Forest Service (FS), as a significant land management agency within the Northwest, has been actively involved in conserving fish and wildlife resources within their jurisdiction. As a result of concerns over the effects of land management activities on fish and wildlife resources, the FS amended their Land and Resource Management Plans (LRMP) for each forest in Oregon and Washington. These amendments are commonly known as the Northwest Forest Plan (NWFP), Inland Native Fish Strategy: Interim Strategies for Managing Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada (INFISH), and the Interim Strategies for Managing Anadromous Fish-Producing Watersheds on Federal Lands in Eastern Oregon and Washington, Idaho and Portions of California (PACFISH). Within each of these plans was an aquatic conservation strategy (ACS) which is comprised of four basic elements: Riparian reserves, key watersheds, watershed analysis, and watershed restoration.

One of the more significant natural resource management issues that exists on Federal lands is the numerous stream/road crossings that impair fish passage. The impairment of fish passage resulting in restricted access to spawning and rearing habitat is one of the more easily recognized adverse effects from ongoing land management practices. The restoration of fish passage can have some of the most significant and immediate benefits for restoring fish. The FS recognized this need, identified in various FS and NOAA Fisheries reports and assessments. An ACS objective specific to the NWFP states that FS will manage lands to maintain and restore connectivity within and between watersheds. Region 6 of the FS has initiated a program to reconnect fragmented fish habitats by restoring fish passage at stream/road crossings within watersheds, especially key and priority watersheds, throughout Oregon and Washington.

The FS program to restore artificial fish passage barriers includes an inventory of potential barriers, education and training of FS personnel regarding barrier removal, and coordination with Federal and state resource and regulatory agencies. From 2000 through 2002, Region 6 of the FS inventoried approximately 80% of its culverts at stream/road crossings on fish-bearing streams. To date, approximately 4,000 culverts across the 18 National Forests and the one Scenic Area in Eastern Oregon and Washington have been assessed for culvert type, length, width, and height, culvert slope, channel alignment, pool depth at culvert outlet, jumping height to culvert outlet, and channel gradient. Of the measured culverts, about 80% pass adult salmon, 50% pass adult resident fish, and 20% pass juvenile fish. The Region 6 FS created a curriculum regarding the planning, designing, installation and monitoring of culvert replacements. The new training sessions, entitled “Restoration of Aquatic-Species Passage Using Stream Simulation,” emphasize the ways in which culvert replacements should be designed to accommodate natural hydrological and ecological processes. Finally, to create even more efficiencies in replacing culverts for fish passage, the Region 6 FS has worked with regulatory agencies to streamline permit processes for culvert installations, resulting in this programmatic consultation described within this Biological Opinion (Opinion).

1.1 Background and Consultation History

This programmatic consultation for the proposed restoration of fish passage at identified stream/road crossings was initiated to help streamline the implementation of individual projects. The FS and Bureau of Land Management (BLM) were both evaluating ways to restore fish passage at stream/road crossings. As these projects would involve ESA section 7 and EFH consultation with NOAA Fisheries, the FS and BLM decided that a programmatic consultation would provide a consistent region-wide approach to removing and replacing stream/road crossings to provide fish and streamline the process. The FS and BLM in a joint letter, dated July 19, 2002, requested programmatic consultation for fish passage restoration with NOAA Fisheries and the U.S. Fish and Wildlife Service (FWS). As originally proposed, activities within Oregon and Washington would be included. NOAA Fisheries responded to the FS and BLM request in a letter dated August 15, 2002, providing a list of species that would occur within the program area and additional guidance for completing a consultation under section 7 of the ESA and EFH under the Magnuson-Stevens Fishery Conservation and Management Act (MSA).

During the six months after consultation was initiated, a number of meetings and discussions were held with FS, BLM, FWS, and NOAA Fisheries to jointly refine the scope of the work and develop a biological assessment (BA). Early on, the FS and BLM revised the program area to eliminate Western Oregon, which had existing programmatic coverage for culvert replacements. The initial meetings were focused on technical and engineering aspects of the action. Experts from each agency met to clarify design criteria that could be incorporated into the programmatic consultation and provide a reasonable predictability of effects on ESA-listed fish. Additional discussion concerned the extent to which restoration of stream process in addition to fish passage were to be included in the action. These discussions focused on the merits of structures wider than bankfull width and evaluated the criteria that would be used to determine when a crossing should be removed and when a bridge would be most appropriate.

As many of the technical aspects of the programmatic were being resolved, discussions shifted to implementation and assessing effects of the programmatic action. Programmatic actions by their nature contain a range of activities at diverse locations with variable site conditions. Because of the nature of the proposed action is to restore fish passage, and also considering variable site conditions and potential complexity of design, an interdisciplinary design team (IDT) was established by the FS as a means to incorporate local expertise and knowledge and to allow greatest flexibility in project design. The IDT is composed of three individuals from within the local administrative unit with expertise in biology, stream geomorphology, and engineering/hydrology. The team provides professional knowledge and discretion for adaptable design processes while minimizing the need for individual project review by NOAA Fisheries and FWS. The BA described the range of activities and typical approaches that would be taken and the responsibility of the IDT. The BA described the effects of the programmatic action based on the IDT‘s ability to adapt to local site conditions, thereby maximizing the restoration potential for each project while minimizing adverse effects.

Due to various circumstances, the BLM decided to withdraw from the proposed action, and the FS completed and submitted the BA to FWS and NOAA Fisheries with a request for formal consultation in a letter dated April 28, 2003. The proposed action consists of four categories of activities:

- Culvert/Road-Fill Removal and Channel Restoration
- Culvert Replacement with a Stream Simulation Culvert or Open-Bottomed Arch
- Culvert Replacement with a Stream Simulation Bridge
- Maintenance of Programmatic Fish Passage Projects

The program area for this consultation is that portion of Oregon east of the Cascade Mountains' crest and the whole of Washington, wherever FS administrative units are found. Those portions of the Mt. Hood National Forest, which occur east of the Cascade Mountains' crest, and the Crooked River National Grasslands are excluded. The action area for this consultation includes all areas upstream to the upper limit of accessible habitat and 300 feet downstream of the individual stream/road crossings affected by completion of culvert replacement activities described in this Opinion. The IDT will be responsible for selecting, designing, implementing, and monitoring each project subject to this programmatic consultation. Where the scope of action or effects are greater than those covered by this Opinion, a separate consultation will be required.

For the purposes of this Opinion, the FS identified the Lower Columbia River (LCR) chinook salmon (*Oncorhynchus tshawytscha*); Upper Columbia River (UCR) spring-run chinook salmon; Puget Sound (PS) chinook salmon; Snake River (SR) fall-run chinook salmon; SR spring/summer-run chinook salmon; Columbia River (CR) chum salmon (*O. keta*); Hood Canal (HC) summer-run chum salmon; LCR steelhead (*O. mykiss*); Middle Columbia River (MCR) steelhead; UCR steelhead; and Snake River Basin (SRB) steelhead as occurring within the project area and under the jurisdiction of NOAA Fisheries. The FS has indicated that the proposed programmatic action is likely to adversely affect these species.

1.2 Description of the Proposed Action

The FS has proposed to conduct up to 120 culvert removal and replacement projects per year. There are 12 FS units within the project area. An even distribution of projects would result in 10 projects per FS unit each year. Individual FS units can implement more than 10 projects per year, as long as the overall total for all units does not exceed 120. To limit the amount of stream and riparian disturbance that would occur from the proposed activities in any one area, the FS unit has proposed that no more than five projects per year would be implemented within any one watershed defined by 5th HUC (Hydrologic Unit Code). The FS will initiate actions for only those stream/road crossings that have been previously surveyed and determined to impair fish passage and are included in the FS database.

Region 6 FS policy provides guidance as to the ways in which fish passage culverts at road crossings should be constructed and includes the following design standards:

- Meet or exceed state requirements and guidance for fish passage.
- Provide passage for all fish species and life stages present at that location.
- Culvert width should not constrict the stream at 2-year high flow (bankfull width).
- The natural stream gradient and substrate material, above and below the structure, will be simulated through the structure.

To accomplish these goals and objectives, the FS further defined the types of actions, design standards, design approaches, and project implementation with conservation measures that will be included in this consultation as described below.

1.2.1 Type of Activity

The FS proposes the following four types of culvert treatment actions to restore fish passage at existing stream/road crossings:

Culvert/Road-Fill Removal and Channel Restoration. This activity will occur to restore physical and biological connectivity in association with a closed/decommissioned road. When the Fish Passage Interdisciplinary Team determines that culvert removal is the best alternative, impassible culverts will be removed and the channel and riparian area will be reconstructed to mimic natural bankfull width and active floodplain dimensions which exist upstream and downstream of the project area.

Culvert Replacement with a Stream Simulation Culvert or Open-Bottomed Arch. This activity will occur to restore physical and biological connectivity where an existing forest road is required for National Forest transportation needs and 100-year flows and associated debris can be accommodated by a culvert or open-bottomed arch. When a Fish Passage Interdisciplinary Team determines that a culvert replacement is the best alternative, impassible culverts will be removed and replaced with one of the following stream simulation structures: Culvert or open-bottomed arch. Culvert or open-bottomed arch widths will be at least bankfull width. Flood relief culverts on floodplains associated with Rosgen C, E, and B stream types may be used.

Culvert Replacement with a Stream Simulation Bridge. This activity type will occur to restore physical and biological connectivity where an existing forest road is required for National Forest transportation needs, if expected 100-year flows and associated debris could not be accommodated with a culvert or open-bottomed arch, or project costs for a bridge approximate those for culvert or open-bottom arch. When a Fish Passage Interdisciplinary Team determines that replacement by a bridge is the best alternative, impassible culverts will be removed and replaced with a stream simulation bridge. Bridge footings will be placed beyond bankfull width, with possible flood relief culverts or additional spans associated with Rosgen C, E, and B stream types.

Maintenance of Programmatic Fish Passage Projects. Maintenance activities will be directed at the aforementioned culvert replacement activity categories designed and constructed under this

BA. Maintenance actions include removal of debris that have accumulated at the culvert, open-bottomed arch, or bridge inlet during flood events and have been determined to obstruct fish passage or pose threats to the integrity of the road crossing. Woody debris removed from the road-crossing inlet would be placed within the immediate vicinity downstream of the road crossing.

1.2.2 Design Parameters

Where a stream/road crossing is being replaced, the new design will be based on a stream simulation design approach. The stream simulation designs are intended to mimic the natural stream processes as closely as possible at road/stream crossings within a culvert, opened-bottom arch, or under a bridge allowing for fish passage and conveyance of sediment and large wood and debris. The proposed stream simulation designs shall include the following structure and stream channel parameters:

<u>Width of Structure</u>. The width at stream elevation of culverts, opened-bottom arches, and between bridge footings shall be equal to, or greater than, the bankfull channel width (structure widths on National Forests within the state of Washington must be at least bankfull width x 1.2 + 2 to comply with state requirements). The minimum structure width shall be 6 feet to allow placement of stream simulation material. For channel types with developed floodplains (*e.g.* Rosgen channel types C, E, and B), the structure must accommodate a 100-year flood flow without significant change in substrate size and composition. To meet this requirement, C, E, and B channel types require structures wider than bankfull or flood relief culverts. When possible, flood relief culverts will be designed to restore and maintain access to off-channel rearing and high flow refuge areas for juvenile and adult fish. Therefore, existing floodplain channels should be the first priority for location of flood relief culverts and should be installed in a manner that matches floodplain gradient and does not lead to scour at the outlet.

<u>Channel Slope</u>. The structure slope shall approximate the average slope of the natural stream from approximately 20 times the stream width upstream and 20 times the stream width downstream of the site (or to the nearest grade control) in which it is being placed. The maximum slope for closed-bottomed culverts shall not exceed 6% because of difficulties in retaining substrate in the culvert at higher gradients. Open-bottomed arches can be placed in channel gradients that exceed 6%

<u>Embedment</u>. If a culvert is used, the bottom of the culvert shall be buried into the streambed not less than 30% and not more than 50% of the culvert height. For open-bottomed arches and bridges, the footings or foundation shall be designed to be stable at the largest anticipated scour depth.

<u>Bridges</u>. Maximum individual span length shall not exceed 135 feet. No piers, abutments, or exposed riprap shall be placed within bankfull width.

The FS has indicated that the following types of projects would not be included in the proposed action:

- Projects that lead to headcutting below the natural stream gradient.
- Culvert widths less than bankfull width.
- Embedded culverts at a slope greater than 6%.
- Baffled culverts.
- Culvert retrofitting.
- Active channel and hydraulic design methods.
- Individual bridge spans >135 feet.
- Projects not within in-water work window.
- Culvert locations not in Region 6 culvert database.
- No more than 5 projects within a 5th field HUC per year.

1.2.3 Interdisciplinary Design Team (IDT)

The design and construction of stream/road crossings can be complex and may require expertise in engineering, hydrology/fluvial geomorphology, and fisheries biology. IDTs have been a part of the FS culvert program for some time. The existing IDTs are comprised of individuals with this knowledge and these skills, and their expertise will allow more flexibility in project designs and in consideration of site-specific characteristics. Involvement of the individual team members will vary throughout the planning process, depending on information required during a particular planning phase. The IDT will be responsible for assessing each existing culvert and confirming the nature and extent of blockage of fish passage. This team will apply various factors for prioritizing specific projects within the various watersheds and within streams and stream reaches. These factors will include biological and physical parameters that define the potential for restoring habitat access and function that contributes to ESA-listed species. The IDT will also consider the practicability of undertaking and completing projects.

The IDT will initiate the design process for selected high-priority projects by first identifying those site characteristics and conditions that would occur naturally and support ESA-listed fish. The IDT will conduct a general field review of the site, identifying biological and physical characteristics to help guide the design process. The IDT will consider present and desired conditions, and will determine what can reasonably be incorporated into each project design to promote restoration of properly functioning conditions (PFC) *i.e.*, those conditions that occur naturally and support ESA-listed fish[1]. The information obtained from a field review will help

[1]See, NMFS, (Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale (1996); often referred to as the Matrix of Pathways and Indicators, or MPI. In the MPI framework, the pathways for determining the effect of an action are represented as six conceptual groupings (*e.g.*, water quality, channel condition) of a suite of habitat condition indicators. The indicators constitute the habitat aspects of a species' biological requirements--the essential physical features that support spawning, incubation, rearing, feeding, sheltering, migration, and other behaviors. Such features include adequate instream flow, pure cold water, loose gravel for spawning, unimpeded fish passage, deep pools, and abundant large tree trunks and root wads. Indicator criteria (mostly numeric, though some are narrative) are provided for three levels of environmental baseline

the IDT develop a project that provides the greatest benefit for fish passage, movement of sediment and large wood, and goals for additional stream restoration efforts.

The IDT will oversee the collection of project site data essential for the design of a stream simulation structure. This includes information that describes physical processes in the watershed and stream system and provides parameters for designing crossing structures. The information will include potential for landslide and debris flows, flood flows, channel character and stability, and floodplain character and flooding potential. The collected information will help the IDT consider project alternatives. This information will provide the basis for documenting the project decision process and develop project-specific plans.

The IDT will submit stream simulation designs to the Forest Engineer for review. Further, Master Performer Teams will provide additional reviews for all larger and more complex projects (culverts, open-bottomed arches, and bridges with more than a 20-foot span, costing more than $100,000, or when requested). During FY2003, for instance, the Master Performer Teams will review approximately 70% of the projects, a general indicator as to the level of involvement by Master Performer Teams in future years.

The IDT will document project design, review, and implementation throughout the process. This will allow tracking of those steps essential to meet stream simulation goals. The project documentation will contain the following: (1) Width and slope of impassable culvert; (2) fish species and life history stages above and below impassable culvert; (3) bankfull width and slope of stream channel; (4) designation of channel substrate; (5) proposed structure type; (6) width and slope of proposed structure; and (7) risk of headcutting. This information is needed for monitoring of the project and during the project review to ensure the intended design for a culvert, open-bottomed arch, or bridge was followed.

1.2.4 Construction Methods, Impacts, and Applied Conservation Measures

Each stream/road crossing project will be implemented by incorporating construction methods and conservation measures to minimize short-term impacts and effects. The FS estimated that with the expected impacts and applied conservation measures, there may be up to 3 cubic yards, and in rare instances up to 5 cubic yards, of fine sediments discharged into the stream at each project location. The following summarize the typical methods and conservation measures that will be applied for each phase of the project, described in more detail in the BA.

Equipment. Equipment used for all culvert removal and replacement projects would typically consist of a mix of the following: Back hoe, bulldozer, tractor, grader, dump truck, front-end loader, excavator, crane, concrete pumper truck, paving machine, pile driver, pumps, helicopters,

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condition: Properly functioning, at risk, and not properly functioning. The effect of the action upon each indicator is classified by whether it will restore, maintain, or degrade the indicator.

explosives, hydraulic hammers, hydroseeding truck, large and small compactors, hand shovels, and rakes.

Site Preparation. Site preparation will include flagging boundaries of protected and construction areas, storing materials and equipment, and construction of sediment barriers. Expected impacts include removal of vegetation and clearing of up to one acre of ground. Applied conservation measures will include implementing a Pollution and Erosion Control Plan (PECP), minimizing use of heavy equipment, maintaining clean equipment, and limiting any new ground clearing activities close to streams where exposed sediments cannot be contained.

Excavation of Road Fill Above Wetted Perimeter. Road fill at the stream/road crossing will be excavated to just above wetted perimeter. Typically, equipment will work from the existing road fill, and excavated material would be stored at a nearby stockpile site. For culvert removal projects, road fill within the active floodplain will be hauled to a permanent waste area. As necessary, machinery will cross streams at designated temporary stream crossings. Stream channel substrate will be disturbed at temporary stream crossings. Applied conservation measures include working during the state's recommended in-water work windows, implementing PECP and Spill Prevention and Containment Plan (SPCP), applying state water quality guidelines, minimizing heavy equipment use and fuel/oil leakage, minimizing earthmoving erosion, and minimizing stream crossing sedimentation.

Isolation of Construction Activities from Stream Flow. The rerouting of stream flows will isolate the project work from the stream. This process will involve removing aquatic organisms from the project site, and includes the construction of water diversion structures. These structures may be designed to reroute flows around the project site and outside of the channel or simply shift flows within the existing channel. The water diversion structures may include appropriately designed or screened dams, dikes, and culverts. Expected impacts include the temporary isolation of stream habitat from access by fish and aquatic organisms, temporary impairment of fish movement upstream and downstream of the project, removal of riparian vegetation, and exposure of bare ground. Applied conservation measures for isolating the construction from stream flow include working during the state's recommended in-water work widows, using appropriate fish handling and transfer protocols, applying PECP and SPCP, minimizing heavy equipment use and fuel/oil leakage, minimizing earthmoving related erosion, minimizing stream crossing sedimentation, and minimizing sedimentation through dewatering.

Removal of Impassable Culverts and Excavation of Channel Substrate. Removal of the culvert and excavating the stream channel involve removal of road fill immediately associated with the existing culvert. The culvert removal will be followed by excavation of the road fill and streambed material down to the bottom of construction elevations and wide enough to accommodate a bankfull culvert, open-bottom arch, or bridge footings. Fill will be stockpiled or hauled to a permanent waste area. Excavating equipment will typically work from the road fill and cross the stream within the dewatered area or at a designated stream crossing. During excavation, excess groundwater will be removed from the work area by pumping to a treatment area before discharge back into any water body. Expected impacts and conservation measures are similar to those for initial road base excavation and work site isolation.

Construction of New Structures, Replacement of Backfill, and Embed Structures. Completion of the stream/road crossing project entails the placement of a new structure and/or the restoration of a stream channel, bank, and floodplain to mimic natural conditions consistent with those conditions upstream and downstream of the project site. For culvert removal, the stream channel and floodplain areas would be reconstructed and stabilized using natural materials such as large wood or boulders. For new culverts, bedding material, culvert, and road fill will be placed in sequence. For open-bottom arches, the construction sequence will be similar, beginning with the initial pouring of concrete footings, assembly of the arch, and the placement of road fill. For bridges, work will involve the construction of bridge abutments, piers and footings, and headwalls, and will involve driving pilings, pouring concrete, and placement of rock riprap.

The streambed will be reconstructed for each structure after the initial placement using natural substrate materials imported into the project. Work will be completed from existing road fill and machinery will cross streams at designated temporary crossings. Flood relief culverts will be constructed as necessary in the dry. Expected impacts and applied conservation measures are similar to those discussed above.

Removal of Stream Diversions and Restoration of Stream Flow. The restoration of stream flow to the project will involve the removal of the in-water structures isolating the work site. Heavy machinery, operated from the bank or within the channel, may be used to aid in removal of diversion structures. Re-watering the construction site will be controlled by rate of excavation to prevent loss of surface water downstream as the construction site streambed absorbs water. Expected impacts, in addition to those mentioned above, include redistribution of stream channel substrate suspending exposed fine sediments resulting in temporary increase (usually less than 2 hours) in turbidity. Applied conservation measures in addition to those mentioned above, include minimizing the water velocity and discharge rates as flows are reintroduced.

Backfill to Road Surface. Completion of road fill and surfacing may include construction of headwalls, placing fill in thin lifts over the culvert or open-bottomed arch to top of subgrade using backfill material from stockpiling or outside sources, and construction of road surface. Expected impacts and applied conservation measures are similar to those discussed above.

Site Restoration. Site restoration after construction will include establishing long-term erosion protection measures using boulder-sized riprap, plantings, erosion control fabric, seed, and mulch. Stockpiled woody debris will be placed within the stream in the project vicinity. Equipment and excess supplies will be removed and the work area will be cleaned. Expected impacts and applied conservation measures are similar to those discussed above.

Maintenance. Maintenance activities for the newly-constructed stream/road crossing are anticipated periodically to move accumulation of large wood at the inlet of culverts, open-bottomed arches, or bridges. All large wood will be placed immediately downstream of the affected structure. When access permits, large wood will be placed within the bankfull channel. Machinery used to remove and place large wood will operate from the road prism, a temporary access to the stream channel, or within the stream channel. In most cases, maintenance activities will usually be completed in two days or less. Expected impacts may include establishment of a temporary staging and stockpile area and access road to the stream that may require clearing or grubbing. Any necessary temporary stream crossing will disturb stream channel substrate. Anticipated conservation measures are consistent with those applied during actual project construction mentioned above.

Post-Project (Streambed Reconstruction). During the unlikely circumstance that streambed degradation associated with the project occurs, remedial actions will be taken to restore substrate within the structure and/or scour pool after determination that the project design is fundamentally sound. Replacement of streambed substrate will entail the site preparation, isolation of construction from stream, placement of bed material, restoration of flows, and site restoration as discussed above. Expected impacts and applied conservation measures are similar to those discussed above.

1.2.5 Annual Monitoring and Reporting Requirements

Monitoring. Each project will be monitored by the IDT or other identified individual or group. Monitoring will include the field observations after high flow events, which occur during the first fall/winter/spring after project completion to assess the following parameters:

- Headcutting below the natural stream gradient.
- Substrate embeddedness in the culvert.
- Scour at the culvert outlet.
- Erosion from sites associated with project construction.

Depending on the results of the monitoring, followup actions may be required. Where headcutting, loss of embedded material, or outlet scour pool is evident, remedial action will be required. Re-establishment of embedded materials may be appropriate without additional consultation. Where design changes or additional work (other than that discussed above) are necessary, a separate consultation may be required.

Project Tracking and Annual Reporting. An annual reporting requirement will be implemented through the Interagency Restoration Database (IRDA) and include: (1) Project ID, (2) project name, (3) project location, (4) culvert removal or replacement, (5) width and slope of impassable culvert, (6) fish species, evolutionarily significant unit (ESU), and life history stages above and below impassable culvert, (7) bankfull width and slope of stream channel, (8) designation of channel substrate, (9) new structure type, width and slope of new structure, (10) miles opened to fish passage, and (11) number of ESA-listed fish injured or killed. The IRDA database shall be updated with all required information for each project by December 15 of each year, and an annual monitoring report will be submitted by January 31 of each year.

1.2.6 Project Management

Project Manager. The Regional Engineer is responsible for implementing this programmatic action as a whole. The Forest Engineer is responsible for each individual project within their administrative unit. The project manager will provide the official point of contact and coordination between NOAA Fisheries and the FS for programmatic action or individual projects.

Program and Annual Field Review. An annual review of selected projects will be coordinated by the Regional Engineer and include an interagency panel to look at successes and failures. This panel will consider various factors, including the project design consideration and any extenuating circumstances that contributed to what worked or what did not work. Individual project and programmatic recommendations will considered.

2. ENDANGERED SPECIES ACT

The ESA (16 U.S.C. 1531-1544), amended in 1988, establishes a national program for the conservation of threatened and endangered species of fish, wildlife, and plants and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with FWS and NOAA Fisheries, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitats. This biological opinion is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations found at 50 CFR Part 402.

2.1 Biological Opinion

The objective of the ESA portion of this programmatic consultation is to determine whether the adoption of the proposed measures for fish passage improvement projects are likely to jeopardize the continued existence of LCR chinook salmon, UCR spring-run chinook salmon, PS chinook salmon, SR chinook salmon, SR spring/summer-run chinook salmon, CR chum salmon, HC summer-run chum salmon, LCR steelhead, MCR steelhead, UCR steelhead, and SRB steelhead or cause the destruction or adverse modification of designated critical habitat. The BA and request for consultation provided by the FS, described below, included the finding that actions permitted using the proposed conservation measures are "not likely to adversely affect" (NLAA) for PS chinook salmon (fall-run), SR fall-run chinook salmon, CR chum salmon, and HC summer-run chum salmon nor adversely modify critical habitat for SR fall-run chinook salmon and SR spring/summer-run chinook salmon, and LAA for LCR chinook salmon, UCR spring-run chinook salmon, PS chinook salmon (spring-run), SR spring/summer-run chinook salmon, LCR steelhead, MCR steelhead, UCR steelhead, and SRB steelhead.

2.1.1 Biological Information and Critical Habitat

The listing status and history for species addressed in this Opinion are summarized in Table 1. Designated critical habitat for the Snake River fall-run chinook salmon and the Snake River spring/summer-run chinook salmon occurs within the proposed project area. Essential elements of critical habitat for salmonids are: (1) Substrate; (2) water quality; (3) water quantity; (4) water temperature; (5) water velocity; (6)cover/shelter; (7) food (juvenile only); (8) riparian vegetation; (9) space; and (10) safe passage conditions. Based on migratory and other life history timing, it is likely that one or more adult and/or juvenile life stage of these listed ESUs would be present in each individual action area when proposed activities would be carried out. Actions covered by this opinion may affect all of these essential habitat features, although the effects of each individual action will vary in timing, duration, and intensity.

2.1.2 Evaluating the Proposed Action

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR 402 (the consultation regulations). NOAA Fisheries must determine whether the action is likely to jeopardize the listed species and/or whether the action is likely to destroy or adversely modify critical habitat. This analysis involves the initial steps of: (1) Defining the biological requirements of the listed species; and (2) evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributable to: (1) Collective effects of the proposed or continuing action; (2) the environmental baseline; and (3) any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed species' life stages that occur beyond the action area. If NOAA Fisheries finds that the action is likely to jeopardize, NOAA Fisheries must identify reasonable and prudent alternatives.

NOAA Fisheries also evaluates whether the action, directly or indirectly, is likely to destroy or adversely modify the listed species' critical habitat. NOAA Fisheries must determine whether habitat modifications appreciably diminish the value of critical habitat for both survival and recovery of the listed species. NOAA Fisheries identifies those effects of the action that impair the function of any essential element of critical habitat. NOAA Fisheries then considers whether such impairment appreciably diminishes the habitat's value for the species' survival and recovery. If NOAA Fisheries concludes that the action will adversely modify critical habitat, it must identify any reasonable and prudent alternatives available.

For the proposed action, NOAA Fisheries' jeopardy analysis considers direct or indirect mortality of fish attributable to the action. NOAA Fisheries' critical habitat analysis considers the extent to which the proposed action impairs the function of essential elements necessary for migration, spawning, and rearing of the listed species under the existing environmental baseline.

Table 1. References for Additional Background on Listing Status, Critical Habitat, Protective Regulations, and Biological Information for the Listed Species Addressed in this Opinion.

Species	**Listing Status**	**Critical habitat**	**Protective Regulations**	**Biological Information/ Population Trends**
SR fall-run chinook salmon	Threatened 04/22/92 57 FR 14653	12/28/93 58 FR 68543	07/22/1992 57 FR 14653	Waples et al. 1991c; Healey 1991; ODFW and WDFW 1998
SR spring/summer-run chinook salmon	Threatened 04/22/92 57 FR 14653	12/28/93 58 FR 68543 and 10/25/19 64 FR 57399	04/22/1992 57 FR 14653	Matthews and Waples 1991; Healey 1991; ODFW and WDFW 1998
LCR chinook salmon	Threatened 03/24/99 64 FR 14308	Not Designated	07/10/00 65 FR 42422	Myers et al.1998; Healey 1991; ODFW and WDFW 1998
UCR spring-run chinook salmon	Endangered 03/24/99 64 FR 14308	Not Designated	ESA prohibition on take applies	Myers et al.1998; Healey 1991; ODFW and WDFW 1998
CR chum salmon	Threatened 03/25/99 64 FR 14508	Not Designated	07/10/00 65 FR 42422	Johnson et al.1997; Salo 1991; ODFW and WDFW 1998
UCR steelhead	Endangered 08/18/97 62 FR 43937	Not Designated	ESA prohibition on take applies	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998
SR Basin steelhead	Threatened 08/18/97 62 FR 43937	02/16/00 65 FR 7764	07/10/00 65 FR 42422	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998
LCR steelhead	Threatened 03/19/98 63 FR 13347	Not Designated	07/10/00 65 FR 42422	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998
MCR steelhead	Threatened 03/25/99 64 FR 14517	02/16/00 65 FR 7764	07/10/00 65 FR 42422	Busby et al. 1995; Busby et al. 1996; ODFW and WDFW 1998
PS chinook salmon	Threatened 03/24/99 64 FR 14308	Not Designated	July 10, 2000 65 FR 42422	Myers *et al* 1998; WDFW 1993
HC summer-run chum salmon	Threatened 03/25/99 64 FR 14508	Not Designated	02/16/00 65 FR 7764	Johnson *et al.*1997; WDFW 1993

2.1.3 Biological Requirements

Actions permitted under this programmatic action are likely to affect essential elements that support the indicated ESA-listed fish species. The following summarizes the biological requirements for each species as described using physical and biological factors that define PFC and are described in the NOAA Fisheries habitat approach and effects determination matrix (NMFS 1996).

- Water Temperature. Water temperatures affects the survival and production of fish throughout all life stages. In general, cool water temperatures near 10º C tend to benefit egg-to-fry survival, and temperatures near 15º C benefit juvenile rearing.

- Sediment/Turbidity. Increased levels of sedimentation often have adverse effects on fish habitats and riparian ecosystems. Fine sediment deposited in spawning gravels can reduce intergravel oxygen and egg survival. Primary production, benthic invertebrate abundance, and thus, food availability for fish may be reduced as sediment levels increase.

- Chemical Contamination/Nutrients. Aquatic ecosystem perturbations related to chemical contamination include thermal pollution, toxicity due to organic compounds, heavy metals, organic wastes and resulting changes in dissolved oxygen, acidification, and increased eutrophication, affecting system productivity with potential behavioral or lethal effects to salmonids.

- Physical Barriers. Human-constructed physical barriers within the stream channel, such as culverts and irrigation weirs, can impair sediment and debris transport that maintain habitat features and can affect population viability, movement for reproduction, obtaining food and refuge, and emigration for all life stages of salmonids.

- Substrate. Variable, coarse-sized sediments and bed load transport are necessary for spawning, food production, and formation of habitat features.

- Large Woody Debris. Large woody debris in streams is an important roughness element influencing channel morphology, sediment distribution, and water routing.

- Pool Frequency/Quality/Depth. Pools are considered to be one of the most important habitat elements and are the preferred habitat type of most fish, offering low velocity refuges, cooler stream temperatures during summer months, and overwintering habitat.

- Off-channel Habitat. Off-channel habitats comprised of alcoves, side channels, freshwater sloughs, wetlands or other seasonally or permanently flooded areas are important rearing sites for juvenile fish.

- Refugia. Refugia, or designated areas providing high quality habitat, either currently or in the future, are a cornerstone of most species' conservation strategies.

- Floodplain Connectivity. Floodplain help to moderate flows during flood events and provide access for fish to off-channel areas for as refuge and for potential food source.

- Streambank Condition. Streambank condition is related to its ability to dissipate stream power. For many stream channels, riparian vegetation with its woody root masses, along with instream debris, serve as physical barriers to the erosive and downcutting forces of stream power and provide habitat complexity.

- Width to Depth Ratios. The width to depth ratio is an index value that helps describe the shape of a stream channel. Wider shallower channels tend to provide less complex habitat, increase water temperatures, and restrict fish movement.

- Increase in Drainage Network, Road Density and Location, and Change in Peak Base Flows. Road systems within a watershed may be hydrologically connected to the stream networks by roadside ditches or surface runoff. The road systems and modification of watershed drainage can affect quantity and quality of water in the stream and depend on density, proximity, and efficiency of drainage system.

- Disturbance Regime/History. Riparian ecosystems within the PNW used by anadromous salmonids naturally experience periodic catastrophic disturbances, which then move through a series of recovery states over a period of decades to centuries, resulting in a landscape that varies in suitability for salmonids. Altered disturbance regimes from land management actions may affect sediment, large wood, and flows within associated stream systems.

- Riparian Areas. Riparian areas are directly coupled to streams and rivers, the portions of watersheds required for maintaining hydrologic, geomorphic, an ecological processes that directly affect streams, stream processes, and fish habitats.

Additional background on listing status, biological information, and critical habitat elements for these listed ESUs are described below.

Chinook Salmon (*Oncorhynchus tshawytscha*)
Chinook salmon in streams and rivers are generally divided into two races: Spring- and fall-run chinook salmon. Spring-run chinook enter freshwater from April though June, and are usually associated with larger rivers and streams that have adequate summer flows and deep resting pools for adults during the summer. Fall-run chinook enter freshwater from September through December and use many of the medium-sized and larger streams with access from the ocean through low gradient stream habitat. Their annual spawning distribution in smaller streams is dependent on the amount of fall rains and resultant streamflow.

Spring-run chinook spawn in the early fall, earlier than fall-run chinook in most rivers. Fall-run chinook spawn from early fall to mid-winter. Chinook salmon are semelparous and die after spawning. Chinook fry emerge in late winter to early spring and typically begin a downstream migration to the river estuary or the ocean. Variations from this pattern occur in all populations, with some fry remaining in freshwater for a year. Chinook salmon fry and parr generally rear in larger streams and rivers. The typical life cycle for chinook salmon is to spend a few months in freshwater and from two to five years in saltwater and thus they are ocean-rearing. Many variations occur in the freshwater rearing timing, and precocious males return from the ocean a year or two early as jacks.

LCR Chinook Salmon. The lower Columbia River is characterized by numerous short- and medium-length rivers that drain the coast ranges and the west slopes of the Cascade Mountains. The LCR chinook salmon ESU includes all native populations from the mouth of the Columbia River to the crest of the Cascade Range, excluding populations above Willamette Falls.

Most fall-run fish in the LCR chinook salmon ESU emigrate to the marine environment as subyearlings. Timber harvest and road activities continue to be of concern for this ESU. Agriculture is widespread within this ESU and has affected riparian vegetation and stream hydrology. The ESU is also highly affected by urbanization, including river diking and channelization, wetland draining and filling, and pollution.

UCR Spring-Run Chinook Salmon. This ESU includes spring-run chinook populations found in Columbia River tributaries between Rock Island and Chief Joseph Dams, notably the Wenatchee, Entiat, and Methow River Basins. The populations are genetically and ecologically separate from the summer- and fall-run populations in the lower parts of many of the same river systems. Although fish in this ESU are genetically similar to spring-run chinook in adjacent ESUs (*i.e.*, mid-Columbia and Snake), they are distinguished by ecological differences in spawning and rearing habitat preferences. For example, spring-run chinook in upper Columbia River tributaries spawn at lower elevations (500 to 1,000 m) than in the Snake and John Day River systems.

UCR spring-run chinook salmon are considered stream-type fish, with smolts migrating as yearlings. Most stream-type fish mature at 4 years of age.

Spawning and rearing habitat in the Columbia River and its tributaries upstream of the Yakima River include dry areas where conditions are less conducive to chinook survival than in many other parts of the Columbia Basin. Salmon in this ESU must pass up to nine Federal and private dams, and Chief Joseph Dam prevents access to historical spawning grounds farther upstream. Degradation of remaining spawning and rearing habitat continues to be a major concern associated with urbanization, irrigation projects, and livestock grazing along riparian corridors.

PS Chinook Salmon. This ESU includes all naturally-spawned populations of chinook salmon from rivers and streams flowing into Puget Sound, including the Straits of Juan De Fuca from the Elwha River eastward, including rivers and streams flowing into Hood Canal, South Sound, North Sound, and the Strait of Georgia in Washington. Chinook salmon (and their progeny) from the following hatchery stocks are considered part of the listed ESU: Kendall Creek (spring-run); North Fork Stillaguamish River (summer-run); White River (spring-run); Dungeness River (spring-run); and Elwha River (fall-run).

The Skagit River and its tributaries, the Baker, Sauk, Suiattle, and Cascade Rivers, constitute what was historically the predominant system in Puget Sound containing naturally-spawning populations. Spring-run chinook salmon are present in the North and South Fork Nooksack Rivers, the Skagit River Basin, the White, and the Dungeness Rivers. Spring-run populations in the Stillaguamish, Skokomish, Dosewallips, and Elwha Rivers are thought to be extinct. Summer-run chinook salmon are present in the Upper Skagit and Lower Sauk Rivers in addition to the Stillaguamish and Snohomish Rivers. Fall-run stocks (also identified by management agencies as summer/fall runs in Puget Sound) are found throughout the region in all major river systems. Adult spring-run chinook salmon in Puget Sound typically return to freshwater in April and May and spawn in August and September. Adults migrate to the upper portions of their respective river systems, and hold in pools until they mature. In contrast, summer-run fish begin their freshwater migration in June and July and spawn in September, while summer/fall-run chinook salmon begin to return in August and spawn from late September through January.

The majority of Puget Sound fish emigrate to the ocean as subyearlings. Many of the rivers have well-developed estuaries that are important rearing areas for emigrating ocean-type smolts. In contrast, the Suiattle and South Fork Nooksack Rivers have been characterized as producing a majority of yearling smolts. The reason for this difference is unknown. Glacially-influenced conditions on the Suiattle River may be responsible for limiting juvenile growth, delaying smolting, and producing a higher proportion of 4- and 5-year-olds compared to other chinook salmon stocks in Puget Sound, which mature predominantly as 3- and 4-year-olds.

Anthropogenic activities have limited the access to historical spawning grounds and altered downstream flow and thermal conditions. Water diversion and hydroelectric dams have prevented access to portions of several rivers. Furthermore, the construction of Cushman Dam on the North Fork Skokomish River may have resulted in a residualized population of chinook salmon in Lake Cushman. Watershed development and activities throughout Puget Sound, Hood Canal, and the Strait of Juan de Fuca regions have resulted in increased sedimentation, higher water temperatures, decreased large woody debris (LWD) recruitment, decreased gravel recruitment, a reduction in river pools and spawning areas, and a loss of estuarine rearing areas.

<u>SR Fall-Run Chinook Salmon</u>. The Snake Basin drains an area of approximately 280,000 km^2 and incorporates a range of vegetative life zones, climatic regions, and geological formations, including the deepest canyon in North America (Hells Canyon). The ESU includes the mainstem river and all its tributaries, from their confluence with the Columbia River to the Hells Canyon Dam complex.

SR fall-run chinook salmon are ocean-type. Adults return to the Snake River at ages 2 through 5, with age 4 most common at spawning. Spawning, which takes place in late fall, occurs in the mainstem and the lower parts of major tributaries. Juvenile fall-run chinook salmon move seaward slowly as subyearlings, typically within several weeks of emergence

With hydrosystem development, the most productive areas of the Snake River Basin are now inaccessible or inundated. The upper reaches of the mainstem Snake River were the primary areas used by fall-run chinook salmon, with only limited spawning activity reported downstream from river kilometer (Rkm) 439. The construction of Brownlee Dam (1958; Rkm 459), Oxbow Dam (1961; Rkm 439), and Hells Canyon Dam (1967; Rkm 397) eliminated the primary production areas of SR fall-run chinook salmon. There are now 12 dams on the mainstem Snake River, and they have substantially reduced the distribution and abundance of fall-run chinook salmon.

SR Spring/Summer-Run Chinook Salmon. The location, geology, and climate of the Snake River region create a unique aquatic ecosystem for chinook salmon. Spring-run and/or summer-run chinook salmon are found in several subbasins of the Snake River. Of these, the Grande Ronde and Salmon Rivers are large, complex systems composed of several smaller tributaries that are further composed of many small streams. In contrast, the Tucannon and Imnaha Rivers are small systems with most salmon production occurring in the main river. In addition to these major subbasins, three small streams, Asotin, Granite, and Sheep Creeks, that enter the Snake River between Lower Granite and Hells Canyon Dams provide small spawning and rearing areas. Although there are some indications that multiple ESUs may exist within the Snake River Basin, the available data do not clearly demonstrate their existence or define their boundaries.

In the Snake River, spring-run and summer-run chinook share key life history traits. Both are stream-type fish, with juveniles that migrate swiftly to sea as yearling smolts. Depending primarily on location within the basin (and not on run type), adults tend to return after either 2 or 3 years in the ocean. Both spawn and rear in small, high-elevation streams, although where the two forms coexist, spring-run chinook spawn earlier and at higher elevations than summer-run chinook.

Even before mainstem dams were built, habitat was lost or severely damaged in small tributaries by construction and operation of irrigation dams and diversions, inundation of spawning areas by impoundments, and siltation and pollution from sewage, farming, logging, and mining. Recently, the construction of hydroelectric and water storage dams without adequate provision for adult and juvenile passage in the upper Snake River has kept fish from all spawning areas upstream of Hells Canyon Dam.

Chum Salmon (*Oncorhynchus keta*)

CR Chum. Chum salmon of the Columbia River ESU spawn in tributaries and in mainstem areas below Bonneville Dam. Most fish spawn on the Washington side of the Columbia River. Previously, chum salmon were reported in almost every river in the lower Columbia River Basin, but most runs disappeared by the 1950s.

Chum salmon enter the Columbia River from mid-October through early December and spawn from early November to late December. Recent genetic analysis of fish from Hardy and Hamilton Creeks and from the Grays River indicates that these fish are genetically distinct from other chum salmon populations in Washington. Genetic variability within and between populations in several geographic areas is similar, and populations in Washington show levels of genetic subdivision typical of those seen between summer- and fall-run populations in other areas and typical of populations within run types

<u>HC Summer-Run Chum Salmon</u>. This ESU includes all naturally-spawned populations of summer-run chum salmon in Hood Canal and it tributaries as well as populations in Olympic Peninsula rivers between Hood Canal and Dungeness Bay, Washington. HC summer-run chum salmon are defined as fish that spawn from mid- September to mid-October. Hood Canal is also geographically separated from other areas of Puget Sound, the Strait of Georgia, and the Pacific Coast. In general, summer-run chum salmon are most abundant in the northern part of the species' range, where they spawn in the mainstems of rivers. Farther south, water temperatures are so high and stream flows are often so low during late summer and early fall that conditions become unfavorable for salmonids. River flows typically do not increase and water temperatures do not decrease until the arrival of fall rains in late October to early November.

Ecologically, summer-run chum salmon populations from Washington must return to freshwater and spawn during periods of water temperature that are too warm for other salmonids.

Steelhead (*Oncorhynchus mykiss*)
Steelhead are rainbow trout that migrate to the ocean. Two races of steelhead are found: Summer and winter steelhead. Summer steelhead are usually associated with larger rivers that have adequate summer flows to accommodate summer upstream migration and deep resting pools with cooler water. Summer steelhead are generally found in rivers with spring-run chinook populations. Summer steelhead tend to spawn in very small, intermittent tributaries and winter steelhead tend to spawn in medium to large streams. Steelhead exhibit a wide variety of migration and freshwater rearing strategies, and spawn from mid-winter to late spring. Summer steelhead fry tend to emerge earlier in the late winter/early spring than winter steelhead fry. Historic steelhead habitat is extremely variable as these fish are adept at migrating through steep gradient stream segments and over waterfalls of moderate height. Steelhead fry and parr can be found in very steep mountain stream habitats and in interior and coastal unconstrained valley streams.

Generally, steelhead remain in freshwater for one to three years and the ocean phase varies from one to three years. Steelhead are oviparous and can return to spawn more than once. Ocean migration is highly variable for steelhead, generally following the north and south migration strategies of coho salmon and chinook salmon. Steelhead are less gregarious than salmon in their ocean phase and individuals can range as far as offshore of the Aleutian Island area.

<u>LCR Steelhead</u>. The LCR steelhead ESU encompasses all steelhead runs in tributaries between the Cowlitz and Wind Rivers on the Washington side of the Columbia River, and the Willamette

and Hood Rivers on the Oregon side. The major runs in this ESU, for which there are estimates of run size, are the Cowlitz River winter runs, Toutle River winter runs, Kalama River winter and summer runs, Lewis River winter and summer runs, Washougal River winter and summer runs, Wind River summer runs, Clackamas River winter and summer runs, Sandy River winter and summer runs, and Hood River winter and summer runs.

Steelhead in this ESU are thought to use estuarine habitats extensively during out-migration, smoltification, and spawning migrations. The lower reaches of the Columbia River are highly modified by urbanization and dredging for navigation. The upland areas covered by this ESU are extensively logged, affecting water quality in the smaller streams used primarily by summer runs. In addition, all major tributaries used by LCR steelhead have some form of hydraulic barrier that impedes fish passage. Barriers range from the impassible structures in the Sandy Basin that block access to extensive, historically occupied steelhead habitat, to the passable but disruptive projects on the Cowlitz and Lewis Rivers.

MCR Steelhead. The MCR steelhead ESU occupies the Columbia River Basin from above the Wind River in Washington and the Hood River in Oregon, and continues upstream to include the Yakima River in Washington. The region includes some of the driest areas of the Pacific Northwest, generally receiving less than 16 inches of precipitation annually. Summer steelhead are widespread throughout the ESU. Winter steelhead occur in Mosier, Chenowith, Mill, and Fifteenmile Creeks in Oregon, and in the Klickitat and White Salmon Rivers in Washington. The John Day River probably represents the largest native, naturally-spawning stock of steelhead in the region. Most fish in this ESU smolt at 2 years and spend 1 to 2 years in salt water before reentering freshwater, where they may remain up to a year before spawning.

The only substantial habitat blockage now present in this ESU is at Pelton Dam on the Deschutes River, but minor blockages occur throughout the region. Water withdrawals and overgrazing have seriously reduced summer flows in the principal summer steelhead spawning and rearing tributaries of the Deschutes River. This is significant because high summer and low winter temperatures are limiting factors for salmonids in many streams in this region (Bottom *et al.* 1984).

UCR Steelhead. The UCR steelhead ESU occupies the Columbia Basin upstream of the Yakima River. Rivers in the area primarily drain the east slope of the northern Cascade Mountains, and include the Wenatchee, Entiat, Methow, and Okanogan River basins. The climate of the area reaches temperature and precipitation extremes, with most precipitation falling as mountain snow. The river valleys are deeply dissected and maintain low gradients, except for the extreme headwaters.

As in other inland ESUs (the Snake and mid-Columbia basins), steelhead in the UCR ESU remain in freshwater up to a year before spawning. Smolt age is dominated by 2- year-olds.

The Chief Joseph and Grand Coulee Dam construction caused blockages of substantial habitat, as did that of smaller dams on tributary rivers. Habitat issues for this ESU relate mostly to irrigation diversions and hydroelectric dams, as well as degraded riparian and instream habitat from urbanization and livestock grazing.

SRB Steelhead. Steelhead spawning habitat in the Snake River is distinctive by having large areas of open, low-relief streams at high elevations. In many Snake River tributaries, spawning occurs at a higher elevation (up to 2,000 m) than for steelhead in any other geographic region. SRB steelhead also migrate farther from the ocean (up to 1,500 km) than most.

Fish in this ESU are summer-run steelhead. They enter freshwater from June to October and spawn during the following March to May. Two groups, based on migration timing, ocean-age, and adult size, are identified: A-run steelhead, thought to be predominately age-1-ocean, enter freshwater during June through August, and B- run steelhead, thought to be age-2-ocean, enter freshwater during August through October. B-run steelhead typically are three to four inches longer at the same age. Both groups usually smolt as 2- or 3-year-olds

Hydrosystem projects create substantial habitat blockages in this ESU. The major ones are the Hells Canyon Dam complex (mainstem Snake River) and Dworshak Dam (North Fork Clearwater River). Minor blockages are common throughout the region. Steelhead spawning areas have been degraded by overgrazing, as well as by historical gold dredging and sedimentation due to poor land management. Habitat in the Snake River Basin is warmer and drier and often more eroded than elsewhere in the Columbia Basin or in coastal areas.

2.1.4 Environmental Baseline

Regulations implementing section 7 of the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, state, or private actions and other human activities in the action area. The environmental baseline also includes the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of state and private actions that are contemporaneous with the consultation in progress. The action area is defined in 50 CFR 402.02 to mean "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

For the purpose of this Opinion, the geographic scope where programmatic activities can be implemented covers that portion of Oregon east of the crest of the Cascade Mountains and the whole of Washington, wherever FS administrative units are found. Those portions of the Mt. Hood National Forest, which occur east of the Cascade Mountains crest, and the Crooked River National Grasslands are excluded. Further, the programmatic area includes non-federal lands where activities help achieve fish passage goals on National Forest System lands.

Contained within the geographic area, site-specific action areas are at stream road crossings where culverts are to be removed or replaced. The action area includes all areas to be affected directly or indirectly by the programmatic activities and not merely the immediate project area. Because programmatic activities may temporarily prevent fish passage during construction and may permanently restore access for all fish species and life stages after construction, the upstream limit of the action area will be determined by the upper limit of accessible habitat. The downstream limit shall be no greater than 300 feet because downstream turbidity, resulting from construction, usually becomes undetectable at this point.

The baseline conditions associated with the action area are described in the BA and other sources and are summarized below. Additional information and sources are referenced in Table 3 of the BA.

General Baseline Conditions. In general, baseline conditions within Oregon and Washington reflect substantial timber harvest in the majority of the upper watersheds and urban and agricultural development in lower watersheds. These conditions may be most affected in lowlands of major river basins. Flow conditions and water quality are poor, and riparian structure and function has been significantly degraded from historical conditions. Oregon's currently available water supplies are often fully or over-allocated during the low flow months of summer and fall. Increased demand for water is linked to the projected increase in human population in the state. Many of the waterbodies in Washington have temperature, sedimentation, and dissolved oxygen problems associated with excessive fine sediments, lack of large woody debris, and disturbed riparian areas. Widespread channel widening and reduced base flows further exacerbate seasonal water temperature extremes. Sedimentation from logging, mining, urban development, and agriculture are a primary cause of salmon habitat degradation.

Riparian areas in Oregon and Washington were extensively changed by logging, mining, livestock grazing, agricultural activities, and associated water diversion projects. Conversion of habitat to agricultural lands has resulted in loss of riparian habitat, unstable streambanks due to poor cattle exclusion devices, excessive chemical levels in the water associated with pesticides and herbicides, high water temperatures, low dissolved oxygen levels, and high levels of fecal coliform.

Dams have affected flow, sediment, and gravel patterns, which in turn have diminished regeneration and natural succession of riparian vegetation along downstream rivers. Several hydropower projects, including Bonneville Dam on the mainstem Columbia River, have caused adverse effects directly to listed species and to habitat along the Lower Columbia River. The series of dams along the Columbia River have blocked off debris and sediment that would otherwise naturally flow down the Columbia resulting in eroded shorelines and modifications to estuarine habitats.

Baseline Conditions Relative to Steam/Road Crossings. Declines in fish numbers can be directly related to the movement of matrix indicators from a predominately Properly Functioning rating to a Functioning-at-Risk or Functioning-at-Unacceptable Risk rating (see, NMFS 1996). The anadromous salmonids on the west coast of the United States have been affected by forestry, agriculture, mining, and urbanization which can simplify, degrade, and fragment habitat. Water diversions for agriculture, flood control, domestic, and hydropower purposes have greatly reduced or eliminated historically accessible habitat. Predation on salmon and steelhead may result where habitat alterations favor predators. Increased water temperatures make salmon more susceptible to disease, which is exacerbated during drought conditions. In an attempt to mitigate for lost habitat, extensive hatchery programs have been created to supplement a decrease in wild fish numbers. Competition, genetic introgression, and disease transmission resulting from hatchery introductions may significantly reduce the production and survival of native, naturally-spawning salmon and steelhead.

For this Opinion, the matrix indicators for those baseline conditions that are of greatest potential of being affected by this action have been emphasized. Those indicators are sediment/turbidity, substrate, and physical barriers, all of which may experience short-term adverse effects during project construction, but long-term benefits thereafter.

Sediment/Turbidity. Timber management and associated road construction is the dominant land management activity on National Forest System lands, private lands, and state timberlands that has contributed to stream sedimentation. On Federally-managed lands, roads contribute more sediment to streams than any other land management feature. The water collected and routed along a road prism and its ditches erodes exposed soil particles and results in increased sedimentation into the stream network. Road construction and maintenance disturbs soil layers on the road read, ditch, and cutslope and are the primary sources of road related sediment. Further, road/stream crossings can be a major source of sediment when the crossings fail, and most of the current stream crossings have resulted in unnatural stream channel widths, slope, and streambed form up and downstream, and these alterations in channel morphology may persist for long periods of time.

Other land use practices that can lead to stream sedimentation include livestock grazing and agricultural practices. Livestock grazing can degrade fish habitat by removing riparian vegetation, destabilizing streambanks, widening stream channels, promoting incised channels, increased soil erosion, and degraded water quality. Agricultural practices, such as cultivation, lead to increased levels of sediment into nearby stream channels.

Varying levels or sedimentation are occurring within the action area subbasins. As indicted in Table 4 of the BA, most of the subbasins with the action area are functioning at risk or not properly functioning for sediment.

Substrate. Substrate quality and quantity are affected by the sources of sediment, flow rate and character, and relative stability of stream and associated hillslopes. The substrate quality is directly related to suspended sediments and erosion and depositional character of the stream. Transport of sediments that are essential to forming streambed features that support spawning and rearing can be disrupted where watershed hydrology has affected in-stream flows and where stream channels have been altered by roads. The rate of sediment input into the stream system can be affected by forest harvest activities that may destabilize hillslopes and result in landslides. Altered flow regimes can destabilize stream channels and banks and can affect source and delivery of sediments and formation of instream habitat features. Although specific information regarding the baseline conditions of substrate, the baseline conditions of fine sediments and turbidity in general can be correlated with sediment conditions as a whole and be indicative of substrate conditions.

Physical Barriers. Undersized culverts not only contribute to increased sediment into stream channels but act as barriers to fish passage. As described in the introduction, the FS completed an inventory of approximately 80% of its culverts at road crossings on fish-bearing streams in 2002. Across the 18 National Forests and one Scenic Area in Oregon and Washington that were surveyed, approximately 4,000 culverts were assessed using a standardized protocol that documented or measured the following variables: (1) Culvert type, (2) culvert length, width, and height, (3) culvert slope, (4) channel alignment, (5) pool depth at culvert outlet, (6) jumping height to culvert outlet, and (7) channel gradient. Of the measured culverts, about 80% pass adult salmon, 50% pass adult resident fish, and 20% pass juvenile fish.

In addition to fish passage barriers on Federal land, a significant number of culvert barriers also occur on non-federal lands throughout the states of Oregon and Washington, fragmenting habitats and fish populations even further. Road crossing barriers usually result from installation of culverts that are undersized and placed at the wrong slope. This can lead to high flow velocities within the culvert and unattainable jumping heights at the culvert outlet, both of which may act as barriers to fish passage.

In addition to habitat fragmentation related to culverts, agricultural practices, such as water diversions and dewatering of stream reaches for irrigation, create migration barriers throughout Oregon and Washington. Even more, the larger hydroelectric, flood-control and irrigation dams contribute to the isolation of numerous resident fish populations and block historical habitat to both resident and anadromous salmonids. The BA indicated that the baseline conditions relative to physical barriers and fish passage in Washington and Oregon are not properly functioning. Thus, not all of the biological requirements of the species within the action area are being met under current conditions. Significant improvement in habitat conditions over those currently available under the environmental baseline is needed to meet the biological requirements for survival and recovery of these species.

2.1.5 Effects of the Proposed Action

NOAA Fisheries' ESA regulations define "effects of the action" as "the direct and indirect effects of an action on the species or critical habitat with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline". Direct effects are immediate effects of the project on the species or its habitat, and indirect effects are those caused by the proposed action and are later in time, but are still reasonably certain to occur (50 CFR 402.02).

Direct effects result from the agency action and can include effects of interrelated and interdependent actions. Future Federal actions that are not a direct effect of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated. Indirect effects are caused by the proposed action, are later in time, and are reasonably certain to occur (50 CFR 402.02). Indirect effects can occur outside of the area directly affected by the action. Indirect effects can include the effects of other Federal actions that have not undergone section 7 consultation, but will result from the action under consultation. These actions must be reasonably certain to occur, or be a logical extension of the proposed action.

2.1.5.1 Long-Term Effects - Project Design and Implementation

The FS has described in the BA the long-term effects expected from the proposed programmatic action. As summarized in Table 5 of the BA, the proposed action is predicted to improve habitat conditions within the action areas. This includes improving habitat access through the: (1) Removal of migration barriers; (2) reduction of fine sediments discharged into the stream by reducing erosion; (3) the increase of potential refugia to juveniles currently blocked by crossings; (4) improvements in watershed and stream connectivity; and (5) increases in potential productivity with increased availability of habitat. With these potential benefits, there remains a certain level of impairment to PFC as it relates to stream channelization. Although the proposed action is not intended to restore PFC at these sites, it is expected that the IDT will provide an opportunity to consider design options that in fact will extend benefits of the action towards PFC in other pathways and indicators. Those primary, long-term beneficial effects described in the BA, in addition to habitat access, are: (1) Productivity relative to populations; (2) watershed function in the transport of sediments and large wood; (3) habitat elements in increased refugia and spawning; and (4) reduction of suspended sediment due to improperly designed culverts.

The long-term effects of the proposed action will be improved habitat access and increased productivity to ESA-listed fish. The intended purpose of the programmatic action is to remove fish passage barriers. By completely removing stream crossings and restoring stream channels or by replacing stream crossings that allow for fish migration there will be a substantial increase in available habitat that is currently unavailable or under utilized. The stream simulation design method is intended to mimic natural stream processes and features evident at each crossing location. The stream simulation methods provide for fish passage by simulating natural stream conditions, substrate, instream structure, and flows. The stream simulation methods also allow for the movement of stream sediments and large wood downstream, providing the necessary materials to maintain habitat features and ecosystem processes. The extent to which each crossing will benefit ESA-listed fish will depend on current state of impairment and ability to implement the design criteria and objectives on the ground.

The IDT will help define site specific conditions that reflect PFC and establish criteria for stream simulation. Although the removal or replacement of stream/road crossings using the stream simulation concept is straightforward, it requires consideration of natural variability and unique circumstances at each crossing. Stream simulation objectives are clear; they maintain processes and features that reflect a natural stream system, and create conditions for which fish are adapted. Yet, current conditions at existing crossings may not represent those natural or anticipated conditions that would be established with continued restoration efforts. Accurately identifying the system potential and what could be reasonably expected to occur at each project location will increase the likelihood that the crossing removal or replacement will be appropriately designed.

The IDT will consider various factors that would affect project design. These may include: (1) Flooding regimes, (2) potential for landslides and debris flows, and (3) the transport of stream substrate and large wood in the system. The stream simulation design approach does not necessarily account for unusual events, unique circumstance, or existing conditions that may have modified stream processes. Without adequate consideration of the effects that an existing road base has on receding flood waters, or a localized increase in stream gradient due to constraints from the existing structure, localized scour may undermine newly-placed stream embedded materials or destabilize channels downstream. The potential for debris flows and the current supply and transport of large wood can vary, depending on site and watershed conditions. The IDT will provide an important function by taking into account these and other circumstances to ensure that the resulting structure will meet the design objectives. Under some circumstances, these factors may lead to wider structures, bridges, and/or flood relief culverts to satisfy channel slope requirements and reduce the potential to destabilize the streambed. The IDT will provide the necessary flexibility in design process to adapt to different site conditions and increase the likelihood that constructed projects will sustain fish passage and not further impair PFC.

The IDT will develop a project implementation plan that considers site conditions and alternative approaches to minimize adverse effects. By considering site-specific conditions, the IDT can better protect important riparian areas from disturbance, can identify staging and material storage areas with the least potential adverse effects, and can anticipate appropriate erosion and pollution protection measures. Because the existing road has already impacted the riparian area at the crossing, and depending on site conditions, using these roadways or associated turnouts for staging can limit the need for additional clearing or ground disturbance.

The FS will check and review project designs through various procedures within the IDT and incorporating the assistance of the FS Master Performer Team for complex and extensive projects. This will provide additional certainty that the intended outcome, stream simulation, will be achieved. Or if not, that followup action would be taken. During program evaluation, the FS and NOAA Fisheries will assess the effectiveness of the IDT process to ensure that anticipated benefits of increase fish passage are achieved.

2.1.5.2 Short-Term Effects - Construction

The short-term effects of each project conducted under this programmatic consultation will include temporary disturbance and modification of stream and riparian areas. The following effects, extracted from the BA, are described relative to the typical approach for project construction including the application of conservation measures as outlined above.

<u>Site Preparation</u>. Because construction activity will occur in the staging and associated stockpile areas outside of the 100-year floodplain, very little activity is expected to occur in the riparian area, and no activity is expected in the stream channel. Further, sediment barriers will be placed

along disturbed sites, where necessary, to prevent potential erosion/sedimentation into a stream channel. Therefore, it is highly unlikely that fish species will be disturbed during this construction phase.

These effects are expected to be similar for all programmatic activities within confined and unconfined stream types, and are minimized by the following conservation measures as described in the BA:

- Develop and implement a PECP and supporting measures.
- Minimize site preparation effects.
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.

Excavate Road Fill above Wetted Perimeter. Construction activities will move from the staging and stockpile areas to the road crossing. Road fill excavation may temporarily disturb fish residing in the immediate area, thereby encouraging up or downstream movement. In addition, when construction machinery crosses the stream at designated locations, fish may be temporarily displaced by equipment or a short-term increase in turbidity. Removal of riparian vegetation is expected to be so minimal as to have insignificant effects to floodplain, riparian, and fish habitat functions.

These effects are expected to be similar for all programmatic activities within confined and unconfined stream types, and are minimized by the following conservation measures as described in the BA:

- Follow in-water work windows.
- Develop a PECP and supporting measures.
- Follow state water quality guidelines.
- Develop a spill prevention and containment plan (SPCP).
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.
- Minimize stream crossing sedimentation.

Isolate Construction from Stream Flow. The capture, transport, and release of ESA-listed fish, if needed, will cause short-term stress and occasional mortality. Effects of stocking captured fish into a new upstream habitat may lead to competitive interactions with fish residing at the site and in some cases can lead to predation on the disoriented fish being released. Both juvenile and adult stages of steelhead and spring/summer-run chinook salmon may be subjected to short-term stress, but most likely only juveniles would be handled and subject to possible mortality. It is highly unlikely that chum or fall-run chinook salmon (PS and SR) juveniles and adults will be present in the stream during project activities, therefore, these fish should not experience stress or mortality.

The construction of a temporary access road through the riparian zone to the stream's edge in preparation for construction of a diversion dam will remove riparian vegetation. However, the amount of vegetation removed is expected to be minimal and have insignificant effects to aquatic or riparian functions.

The dewatered site will temporarily reduce the amount of habitat available to fish, and the diversion structure may temporarily block fish passage. In many cases, the diversion structure will act as a continuation of the barrier presented by the road crossing, therefore, in such cases the diversion structure is not expected to cause any additional adverse effects to upstream movement of ESA-listed fish. Juvenile fish, which may have hidden and stayed in the channel substrate during fish capture and transport, will likely suffer mortality upon dewatering.

These effects are expected to be similar for culvert removal and replacement and post-project construction activities within confined and unconfined stream types and are minimized by the following conservation measures as described in the BA:

- Follow in-water work windows.
- Follow fish handling and transfer protocols.
- Develop a PECP and supporting measures.
- Follow state water quality guidelines.
- Develop a SPCP.
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.
- Minimize stream crossing sedimentation.
- Minimize sedimentation through dewatering.

<u>Remove Impassible Culvert and Excavate Channel Substrate</u>. Fill material being excavated to access and remove the existing culvert followed by excavation of the channel bed may lead to minor sediment spills into the dewatered stream channel. Because all actions will be occurring within a dewatered area, there should be no immediate effects to fish species. The following conservation measures described in the BA will be implemented to minimize the amounts of sediments introduced into the stream channel:

- Follow in-water work windows.
- Develop a PECP and supporting measures.
- Follow state water quality guidelines.
- Develop a SPCP.
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.
- Minimize stream crossing sedimentation.
- Minimize sedimentation through dewatering.

<u>Construct Fish Passage Structure, Replace Backfill, and Embed Structure</u> – Because actions will be occurring within dewatered areas, there should be no immediate effects to fish species.

The following conservation measures described in the BA will be implemented to minimize the amounts of sediments introduced into the stream channel, which can later be transported during flow restoration:

- Follow in-water work windows.
- Develop a PECP and supporting measures.
- Follow state water quality guidelines.
- Develop a SPCP.
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.
- Minimize stream crossing sedimentation.
- Minimize sedimentation through dewatering.

Remove Diversion and Restore Stream Flow. When construction is completed and the diversion dam removed, flow will be restored through the project site, capturing and transporting sediment introduced into the channel from previous construction phases. Flow will be slowly restored to the site to prevent loss of surface water downstream as the construction site streambed absorbs the water. The slow reintroduction of water will decrease the intensity of stream turbidity, as well. The sediment plume will likely be limited to the immediate vicinity (approximately .25 mile downstream) and should dissipate within a few hours. In general, introduced sediments resulting from the previous construction phases, will result in approximately 1-3 cubic yards (and on rare occasions up to 5 cubic yards) of fine sediments introduced into the stream channel. The increased stream turbidity may deposit fine coats of sediment on the channel substrate a short distance downstream, encourage fish to move downstream, and alter behavior patterns for a short time. Because the work will be conducted during the preferred in-water work periods (a time when spawning is not expected and after emergence of fry), the project should not interfere with spawning, egg development, and the sac fry life stage. In cases of fall-spawning fish, the fine layer of sediment deposited on channel substrate will be cleared away as these fish construct their redds. It is anticipated that all project-related sediment will be flushed out during the fall/winter/spring high flows after project completion, therefore, long-term impacts to spawning gravels are not expected. Further, the project-related sediments introduced into the stream channel are minimal, if not insignificant, relative to the annual sediment budget of a watershed, supporting the conclusion that long-term sediment/turbidity impacts will not occur. From this point on, fish passage should be restored for all native fish species and associated life stages.

The following conservation measures outlined in the BA are designed to minimize effects:

- Follow in-water work windows.
- Develop a PECP and supporting measures.
- Follow state water quality guidelines.
- Develop a SPCP.
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.
- Minimize stream crossing sedimentation.

- Minimize sedimentation through dewatering.
- Flow reintroduction.

Backfill to Road Surface. Road fill placement with heavy machinery may temporarily disturb fish residing in the immediate area, encouraging up or downstream movement. This action should not result in fish mortality, and such an impact is expected to be similar for all culvert replacement projects within confined and unconfined stream types.

The following conservation measures, as outlined in the BA, are designed to minimize effects:
- Follow in-water work windows.
- Develop a PECP and supporting measures.
- Follow state water quality guidelines.
- Develop a SPCP.
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.
- Minimize stream crossing sedimentation.
- Minimize sedimentation through dewatering.

Site Restoration. Most site restoration activities will occur outside of the stream channel, with limited activity in riparian areas, such as decompaction of access roads followed by seeding and planting. Most site restoration activities will likely occur in the staging and stockpile areas, away from the stream and riparian zones. Therefore, it is unlikely that fish species will encounter disturbance during this construction phase. Effects are expected to be similar for all programmatic activities within confined and unconfined stream types.

The following conservation measures outlined in the BA are designed to minimize effects:

- Follow in-water work windows.
- Develop a PECP and supporting measures.
- Follow state water quality guidelines.
- Develop a SPCP.
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.
- Minimize stream crossing sedimentation.
- Minimize sedimentation through dewatering.
- Site restoration.

Maintenance. Heavy machinery, used to access and remove large wood at the road crossing inlet, may disturb fish residing in the immediate vicinity, encouraging up or downstream movement. On occasions, when machinery may have to cross a stream channel to remove, transport, or place large wood, fish may be temporarily displaced by equipment or a short-term increase in turbidity. Removal of riparian vegetation is expected to be so minimal as to have insignificant effects to floodplain, riparian, and fish habitat functions. Maintenance activities are expected to be infrequent, usually after 100-year flow events. The effects are expected to be similar for all programmatic activities within confined and unconfined stream types.

The following conservation measures outlined in the BA are designed to minimize effects:

- Follow in-water work windows.
- Develop a PECP and supporting measures.
- Follow state water quality guidelines.
- Develop a SPCP.
- Minimize site preparation effects.
- Minimize heavy equipment fuel/oil leakage.
- Minimize earthmoving-related erosion.
- Minimize stream crossing sedimentation.
- Site restoration.

<u>Post-Project Construction (Restoration of Streambed Embeddedness) and Effects to Fish</u>. Effects and conservation measures are the same as those described in appropriate sections of the above mentioned project phases: Site Preparation, Isolate Construction from Stream Flow and Effects to Fish Species, Construct Fish Passage Structure, Replace Backfill, and Embed Structure, Remove Diversion and Restore Stream Flow and Effects to Fish Species, Site Restoration and Effects to Fish Species.

2.1.6 Effects on Critical Habitat

NOAA Fisheries designates critical habitat based on physical and biological features that are essential to the listed species. Essential features for designated critical habitat include substrate, water quality, water quantity, water temperature, food, riparian vegetation, access, water velocity, space and safe passage. Critical habitat is designated for SR spring/summer-run chinook salmon, and SR fall-run chinook, and consists of all waterways below naturally-impassable barriers. The adjacent riparian zone is also included in the designation. This zone is defined as the area that provides the following functions: Shade, sediment, nutrient or chemical regulation, streambank stability, and input of large woody debris or organic matter. Effects on critical habitat from the proposed action are included in the effects description above.

2.1.7 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation." Other activities within the watershed have the potential to impact fish and habitat within the action area. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes.

As indicated in the BA, the population trends within Oregon and Washington are expected to steadily increase. In general, as development increases the quantity and quality of habitat suitable for threatened and endangered species typically decreases. Based on past trends and types of development, future residential, commercial, and infrastructure development will likely lead to further habitat degradation. Assuming future trends mirror the historical pattern in Oregon and Washington, substantial additional impacts to fish and wildlife due to agriculture are not expected. Timber harvest and associated impacts are concentrated in western Oregon and Washington, however, timber harvest is anticipated in all of the 50 subbasins, to varying degrees, within the action area. Although the rate of harvest appears to be slowing in some areas and improved forestry practices have been implemented, the collective impacts of past and reasonably foreseeable future forestry activities are likely to result in additional future degradation of habitat for listed species. Ongoing activities in Oregon and Washington will help mitigate and/or reverse pollutant sinks and sources. The State of Oregon has developed a comprehensive aquatic conservation strategy and the State of Washington has developed a salmon restoration strategy to help recover dwindling fish stocks.

The ESA listings of fish and wildlife species in the States of Oregon and Washington have been based, in part, on the additive impacts of growth, development, and other human activities. At this point, the trends discussed above indicate that future impacts will progress similarly, leading to additional adverse impacts on all fish and wildlife and their habitats. Changes to past development practices and fish recovery efforts in Oregon and Washington provide hope that past trends are not predictive of future circumstances.

2.1.8 Conclusion

After reviewing the best available scientific and commercial information available regarding the current status of the species considered in this consultation, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is NOAA Fisheries' opinion that the action, as proposed, will not jeopardize the continued existence of the 11 ESUs considered in this Opinion, or destroy adversely modify designated critical habitat.

Our conclusions are based on the following considerations: (1) Taken together, the conservation measures applied to each project will ensure that any short-term effects to water quality, habitat access, habitat elements, channel conditions and dynamics, flows, and watershed conditions will be brief, minor, and timed to occur at times that are least sensitive for the species' life-cycle; (2) the underlying requirement of an ecological design approach that protects and stimulates natural habitat forming processes is expected to result in projects that will have beneficial long-term effects; and (3) the individual and combined effects of all activities are not expected to impair currently properly functioning habitats, appreciably reduce the functioning of already impaired habitats, or retard the long-term progress of impaired habitats toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.9 Conservation Recommendations

Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of threatened and endangered species. Conservation recommendations are discretionary measures suggested to minimize or avoid adverse effects of a proposed action on listed species, to minimize or avoid adverse modification of critical habitats, or to develop additional information. NOAA Fisheries believes the following conservation recommendations are consistent with these obligations, and therefore should be carried out by the FS. This information will help to reduce uncertainty about the effects of past and ongoing human and natural factors leading to the status of listed salmon and steelhead, their habitats, and the aquatic ecosystem within the action area.

1. The FS should develop a method to prioritize stream/road crossing projects and facilitate advanced planning with emphasis on recovery goals and objectives for each ESA-listed fish as they become established.

2. The FS should directly incorporate watershed analysis, transportation management plans, and other analytical processes into the selection and prioritizing of stream crossing removal or replacement.

3. The FS should work closely with the Level 1 teams and incorporate results of completed watershed level consultations and work plans consistent with the LRMP within each Forest when selecting and prioritizing stream crossing removal or replacement projects.

4. The FS should monitor and assess the effectiveness of each project for expanding habitat access and utilization by ESA-listed fish.

In order for NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed salmon and steelhead or their habitats, NOAA Fisheries requests notification of the achievement of any conservation recommendations.

2.1.10 Reinitiation of Consultation

Consultation must be reinitiated if: (1) The amount or extent of taking specified in the incidental take statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or (3) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

If the FS fails to provide specified monitoring information by January 31 of each year, NOAA Fisheries will consider that a modification of the action that causes an effect on listed species not previously considered and causes the incidental take statement of the Opinion to expire. Consultation also must be reinitiated 5 years after the date this Opinion is signed. To reinitiate consultation, contact the Habitat Conservation Division (Oregon Habitat Branch) of NOAA Fisheries, and reference 2003/006676.

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." [16 USC 1532(19)] Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3] Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of the Take

NOAA Fisheries anticipates that the proposed actions considered in this Opinion are reasonably likely to take some of the ESA-listed species through habitat-related harm. Further, NOAA Fisheries expects those actions that require isolation of the in-water work area to result in an additional amount of injury and death. This proposed programmatic action is not intended for use at locations where ESA-listed adult fish are actively spawning, where spawning is eminent, or where spawning redds are active. Due to the life history of SR chinook salmon and complications in otherwise limiting take by managing project timing, take of spawning SR chinook salmon or where spawning is eminent, or take of SR chinook salmon embryos associated with active redds are not authorized in this Opinion.

Take associated with the habitat-related harm caused by actions such as these are largely unquantifiable and are not expected to be measurable as long-term effects on populations. Therefore, although NOAA Fisheries expects these actions to cause some low level of harm, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take because of those habitat-related effects. In instances such as these, NOAA Fisheries designates the expected take as the increase in suspended sediments, turbidity, the disturbance of the streambed and banks, and the disturbance of the riparian areas after the application of conservation measures within the action area for each project as described above. NOAA Fisheries considers this level of take as "unquantifiable".

NOAA Fisheries estimated the amount of take associated with those projects requiring isolation of the in-water work area using the following assumptions: (1) All projects will be isolated from active stream flow; (2) Seventy-five percent of all projects will require fish salvage; (2) up to 120 projects will occur per year, and will be distributed throughout many ESUs; (3) each project that will capture fish is likely to capture fewer than 150 juvenile salmonids; and (4) of the ESA-listed fish to be captured and handled in this way, 98% or more are expected to survive with no long-term effects, and 1-2% are expected to be injured or killed, including delayed mortality because of injury. Nonetheless, the more conservative estimate of 5% lethal take will be used here to allow for variations in experience and work conditions.

Table 2 summarizes expected take by major geographic area and is based on the expectation that the percentage of listed to non-listed salmonids is less than 100%. Because many ESUs that these actions may affect are similar in appearance, assigning this take to groups below the species level is impossible. The summation of expected take below is based on the number and location of projects expected to occur each year and the percentage of listed to non-listed salmonid for each species. The number of listed verses non-listed fish will vary by area and depending on the ESA status of the fish at each project site. Where a substantial number of different species coexist and where hatchery operations occur, the percentage of listed fish that may be affected by each project will be less. An estimate of the ratio of listed fish to non-listed fish in the Columbia River Basin was obtained using NOAA Fisheries' data estimation of percentages of listed spring/summer-run and fall-run chinook, and steelhead smolts arriving at various locations in the Columbia River Basin in 2003,[2] and is generally less than 10% for each species. The percentage of listed fish occurring in headwater streams above hatchery operations would be expected to be higher. For the purposes of this Opinion, a ratio of 50% listed:non-listed salmonids has been used.

The extent and nature of take will vary by species and location. Due to the natural history of chinook salmon, most of the juveniles will not be present during the in-water work period. Due to the natural history of chum salmon, no chum salmon juveniles will be present during the in-water work period. NOAA Fisheries expects take of chinook salmon to be less than that for steelhead, and does not expect any take for chum salmon. Capture and release of adult fish is not expected to occur as part of the proposed isolation of in-water work areas. Thus, NOAA Fisheries does not anticipate that any adult fish will be taken. Even if monitoring proves the 5% mortality rate is accurate, isolation of in-water work area activities will not affect ESA-listed species at the population level. The exemption from the prohibition against take provided by this

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[2] Memorandum from John W. Ferguson, Northwest Fisheries Science Center, to Laurie Allen, NOAA Fisheries (March 20, 2003) http://www.nwr.noaa.gov/1salmon/salmesa/pubs/03outmigration.pdf (estimation of percentages of listed Pacific salmon and steelhead smolts arriving at various locations in the Columbia River Basin in 2003).

incidental take statement applies only to incidental take that occurs due to completion of the proposed project within the action area.

Table 2. Estimate of the Number of ESA-Listed Fish That Will be Injured and Killed Each Year Due to Project Isolation from Active Stream Flow

Geographic Area **Species**	**Life Stage**	**Total Catch**	**ESA-Listed Fish Injured**	**ESA-Listed Fish Killed**
Interior Columbia				
chinook salmon	juvenile	3375	1688	85
steelhead	juvenile	5625	2813	141
chum	juvenile	0	0	0
Lower Columbia				
chinook salmon	juvenile	825	413	21
steeelhead	juvenile	825	413	21
Washington Pudget Sound				
chinook salmon	juvenile	2250	1125	56
chum	juvenile	0	0	0

2.2.2 Reasonable and Prudent Measures

The measures described below are non-discretionary. They must be implemented so that they become binding conditions in order for the exemption in section 7(a)(2) to apply. The FS has the continuing duty to regulate the activities covered in this incidental take statement. If the FS fails to adhere to the terms and conditions of the incidental take statement or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. NOAA Fisheries believes that activities carried out in a manner consistent with these reasonable and prudent measures, except those otherwise identified as exclusions, will not necessitate further site-specific consultation. Activities which do not comply with all relevant reasonable and prudent measures will require individual consultation.

In addition to the conservation measures and proposed construction techniques, NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to avoid or minimize the amount or extent of take of listed fish resulting from implementation of this Opinion. These reasonable and prudent measures would also avoid or minimize adverse effects to designated critical habitat.

The FS shall:

1. Minimize incidental take by appropriate consideration of alternative project designs and implementation methods.

2. Minimize incidental take from general construction by limiting the timing, location, and type of activities that adversely affects riparian and aquatic systems.

3. Ensure completion of a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of minimizing take from permitted activities.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the FS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary and, in relevant part, apply equally to proposed actions in all categories of activity.

1. To implement reasonable and prudent measure #1 (project design and implementation) the FS shall:

    a. Provide the Interdisciplinary Design Team (IDT) with adequate guidance necessary to prioritize crossings, assess site conditions, design crossings, and implement the project as demonstrated with continuing refinement of guidance documents, training manuals and programs or the equivalent.
    b. Provide training in stream simulation method and notify and make space available to NOAA Fisheries.
    c. Update training elements as appropriate and relative to the annual program review and monitoring reports.

2. To implement reasonable and prudent measure #2 (general conditions for construction, operation and maintenance), the FS shall ensure that:

    a. <u>Timing of In-Water Work</u>. To limit project work during that time of the year most appropriate for each project location to minimize adverse effects to ESA-listed fish by conducting work when ESA-listed fish are less likely to be present or where spawning is not eminent, actively occurring, or recently completed, the FS shall:
        i. Complete work below bankfull elevation during the recommended in-water work period as indicated in the most recent ODFW or WDFW preferred in-water work period for the project area, unless otherwise approved in writing by NOAA Fisheries.

ii. Incorporate the most recent ODFW run-timing data located at (http://oregonstate.edu/dept/nrimp/information/timing/TimingData.htm) and modify project in-water work timing as appropriate.

iii. Not initiate or continue in-water work in any project area where adult SR chinook are spawning, where spawning is eminent, or where redds are active and in-water work will displace spawning or pre-spawning adults from spawning areas, or where disruption or dewatering of active redds is likely as determined by an experienced fisheries biologist

b. <u>Fish Exclusion from In-Water Work Area</u>. Where the capture, removal, and relocation of ESA-listed fish are required, the FS shall:

i. Install a block net shall upstream and downstream of the project site secured to the stream channel, bed, and banks until fish capture and transport activities are complete.

ii. Monitor the block net once a day to ensure it is properly functioning and free of organic accumulation.

iii. Size and place the block net in the stream in such a way as to exclude ESA-listed juvenile salmonids expected to occur within the project vicinity at the time of work without otherwise impinging these fish on the net.

c. <u>Fish Handling and Transfer Protocols – Fish Capture Alternatives</u>. Where the capture, removal, and relocation of ESA-listed fish are required, the FS shall:

i. Have a fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish conduct or supervise the operation

ii. Use one or combination of the following methods to most effectively capture ESA-listed fish and minimize harm.

iii. <u>Hand Netting</u>. Collect fish by hand or dip nets, as the area is slowly dewatered.

iv. <u>Seining</u>. Seine using a net with mesh of such a size as to ensure entrapment of the residing ESA-listed fish.

v. <u>Minnow Trap</u>. Place minnow traps overnight and in conjunction with seining.

vi. <u>Electrofishing</u>. Before dewatering, use electrofishing only where other means of fish capture may not be feasible or effective following NOAA Fisheries guidelines found at http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf.

d. <u>Fish Storage and Release</u>. Where the capture, removal, and relocation of ESA-listed fish are required the FS shall:

i. Handle captured fish with extreme care and keep these fish in water to the maximum extent possible for the least amount of time during transfer procedures. The use of a sanctuary net is recommended.[3]

ii. Utilize large buckets (five-gallon or greater) and minimize the number of fish stored in each bucket to prevent overcrowding

iii. Place large fish in buckets separate from smaller prey-sized fish.

iv. Monitor water temperature in buckets and well-being of captured fish.

v. Release fish upstream of the isolated reach in a pool or area that provides cover and flow refuge after fish have recovered from stress of capture.

vi. Document all fish injuries or mortalities.

vii. Include the following notice with each contract issued, or in writing to each party that will supervise completion of the action.

NOTICE. If a sick, injured or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at 360.418.4246. The finder must take care in handling of sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

viii. Contact the NOAA Fisheries Law Enforcement Office if a listed fish is injured or killed at any point during the fish handling operation.

e. Pollution and Erosion Control Plan. The FS shall develop a PECP for each authorized project, one that includes methods and measures to minimize erosion and sedimentation associated with the project. The PECP elements shall be in place before and at all times during the appropriate construction phases. The elements of water quality; spill prevention control and containment; site preparation; heavy equipment usage; earth moving; temporary stream crossings; dewatering; flow reintroduction; and site restoration should be included in the PECP.

f. Water Quality. The FS shall establish turbidity and suspended sediment criteria based on water quality standards of the State or Oregon or State of Washington or other appropriate basis and monitor projects for compliance and the effectiveness

[3] A sanctuary net is a net that has a solid bottom bag that allows for the retention of a small amount of water in the net, thus allowing for less potential impact to netted fish from the net mesh.

of conservation measures for limiting erosion during project construction and site restoration.

g. <u>Spill Prevention Control and Containment Plan</u>. The FS shall develop or verify the existence of a SPCP for each project. The SPCP will include the following:
   i. A description of any regulated or hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.
   ii. Notification procedures, specific cleanup and disposal instructions for different products, quick response containment and cleanup measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

h. <u>Site Preparation</u>. The FS shall:
   i. Flag boundaries of clearing limits associated with site access, riparian crossings, stream crossings, staging and stockpile areas to minimize overall disturbance and disturbance to critical vegetation.
   ii. Establish staging areas (used for construction equipment storage, vehicle storage, fueling, servicing, etc) along existing roadways or turnouts beyond the 100-year floodprone area in a location and manner that will preclude erosion into or contamination of the stream or floodplain.
   iii. Minimize clearing and grubbing activities, if required for preparation of staging or stockpile areas and consistent with IDT project plans and stockpile large wood, trees, riparian vegetation, other vegetation, sand, and topsoil removed for establishment of staging area for site restoration.
   iv. Place sediment barriers around disturbed sites to prevent erosion and sedimentation associated with equipment and material storage sites, fueling operations, and staging areas from entering the stream directly, through natural drainage or road side ditches.
   v. Monitor and maintain erosion controls until site restoration is complete.
   vi. If monitoring or inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.

i. <u>Heavy Equipment</u>. The FS shall minimize fuel/oil leakage from construction equipment into the stream channel and floodplain include the following:
   i. All equipment used for instream work shall be cleaned and leaks repaired before arriving at the project site. Remove external oil and grease, along with dirt and mud. Inspect all equipment before unloading at site. Thereafter, inspect equipment daily for leaks or accumulations of grease, and fix any identified problems before entering streams or areas that drain directly to streams or wetlands.
   ii. Equipment used for instream or riparian work shall be fueled and serviced in an established staging area. When not in use, vehicles will be stored in the staging area.
   iii. Two oil-absorbing, floating booms appropriate for the size of the stream shall be available on site during all phases of construction whenever

surface water is present. Place booms in a location that facilitates an immediate response to potential petroleum leakage.

iv. Diaper all stationary power equipment (*e.g.*, generators, cranes, stationary drilling equipment) operated within 150 feet of any stream, waterbody or wetland to prevent leaks, unless suitable containment is provided to prevent potential spills from entering any stream or waterbody.

j. <u>Earthmoving</u>. The FS shall minimize sedimentation resulting from earthmoving construction activities through the following:

i. Minimize amounts of construction debris and soil falling into streams by installing appropriate erosion control barriers before construction. Such barriers should be maintained throughout the related construction and removed only when construction is complete. When possible, remove debris or large earth spills that have fallen into the channel.

ii. Instream blasting is not covered by this Opinion, however, instream rock splitting by chemical expansion rock splitting or shot-shell powered rock splitting is permitted.

iii. Delineate construction impact areas on project plans and confine work to the noted area. Confine construction impacts to the minimum area necessary to complete the project.

iv. Keep a supply of erosion control materials (*e.g.*, silt fence and straw bales) on hand to respond to sediment emergencies. Use sterile straw or .weed free. certified straw bales to prevent introduction of noxious weeds.

v. Cease all project operations, except efforts to minimize storm or high flow erosion, under high flow conditions that result in inundation of the project area.

vi. Stockpile native streambed materials above the bankfull elevation for later use in project restoration. To prevent contamination from fine soils, these materials shall be kept separate from other stockpiled material, which is not native to the streambed.

k. <u>Temporary Stream Crossings</u>. The FS shall implement methods to minimize turbidity and sedimentation resulting from use of stream crossings and access roads through the following:

I. No equipment is permitted in the flowing water portion of the stream channel except at designated stream crossings.

ii. Where temporary stream crossings are essential, crossings shall be identified on project plans, designated at the project site, shall not increase risks of channel re-routing due to high water conditions, and avoid potential spawning areas when possible.

iii. Stream and riparian crossings shall be minimized and conducted at right angles to the main channel where possible.

iv. Existing roadways or travel paths will be used whenever reasonable.

l. <u>Dewatering</u>. The FS shall minimize project-related sediment introduced into the stream to help meet state turbidity standards; methods to isolate the in-channel project through the following:

i. Divert flow with pumps or structures such as cofferdams constructed with non-erosive devices, such as sandbags, bladder bags, or other means that divert water. Diversion dams constructed with material mined from the stream or floodplain is not permitted.

ii. The temporary bypass system may consist of non-erosive techniques, such as a pipe or a plastic-lined channel, both of which must be sized large enough to accommodate the predicted peak flow rate during construction. In cases of channel rerouting, water can be diverted to one side of the existing channel.

iii. Dissipate flow at the outfall of the bypass system to diffuse erosive energy of the flow. Place the outflow in an area that minimizes or prevents damage to riparian vegetation. If the diversion inlet is not screened to allow for downstream passage of fish, place diversion outlet in a location that facilitates safe reentry of fish into the stream channel.

iv. When necessary, pump water from the de-watered work area to a temporary storage and treatment site or into upland areas and filter through vegetation before reentering the stream channel.

v. Any water intake structure (pump) authorized under this Opinion must have a fish screen installed, operated and maintained in accordance to NOAA Fisheries' fish screen criteria (NMFS 1995) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm)

m. Flow Reintroduction. The FS shall slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden increase in stream turbidity.

n. Site Restoration. The FS shall minimize sedimentation through site restoration including the following:

i. Upon project completion, remove project-related waste. Initiate rehabilitation of all disturbed areas in a manner that results in similar or better than pre-work conditions through spreading of stockpiled materials, seeding, and/or planting with native seed mixes or plants. If native stock is not available, use soil-stabilizing vegetation (seed or plants) that does not lead to propagation of exotic species.

ii. Develop a restoration work plan with sufficient detail to include a description of the following elements, as applicable:

(1) A plan to control exotic invasive vegetation.

(2) Site management and maintenance requirements.

iii. No herbicide application will occur as part of the permitted action. Mechanical removal of undesired vegetation and root nodes is permitted.

iv. When necessary, loosen compacted access roads, stream crossings, stream channel within the dewatered work area, staging, and stockpile areas.

v. For culvert removal or bridge projects, reconstruct the stream channel cross-section and gradient within the area formerly occupied by a culvert in a manner that reflects more natural conditions found up and downstream. Large wood and/or boulders may be placed in the reconstructed stream channel and floodplain.

vi. Instream or floodplain restoration materials such as large wood and boulders shall mimic as much as possible those found in the project vicinity. Such materials may be salvaged from the project site or hauled in from offsite but cannot be taken from streams, wetlands, or other sensitive areas. The use of cable to anchor large wood and rocks is not allowed under this Opinion unless otherwise approved in writing by NOAA Fisheries.

vii. Do not fell conifers in the riparian area for restoration purposes unless conifers are fully stocked or if necessary for safety. If necessary for safety, fell trees toward the stream and leave in place or place them in the stream channel or floodplain. This does not apply to conifer removal in areas necessary for project completion staging and stockpile areas, road fill around the culvert, and access roads.

viii. When necessary, use steep-slope terracing.

ix. Complete necessary site restoration activities within five days of the last construction phase. Replant each area requiring vegetation before the first April 15th following construction.

3. To implement reasonable and prudent measure #3 (monitoring), the FS shall:

a. <u>Project Tracking.</u> Collect project specific information by December 15th of each year on the Interagency Restoration Database (IRDA) through the Regional Ecosystem Office. Reporting elements will include the following:

i. Project ID.
ii. Project Name.
iii. Location.
iv. Culvert removal or replacement.
v. Width and slope of impassable culvert.
vi. Fish species/ESU (and life history stages) above and below impassable culvert.
vii. Bankfull width and slope of stream channel.
viii. Designation of channel substrate.
ix. New structure type.
x. Width and slope of new structure.
xi. Miles opened to fish passage.
x. Number of injuries/mortalities to ESA-listed fish.

b. <u>Effectiveness Monitoring.</u> Assess each project to determine if the project as implemented continues to meet project objectives and stream simulation goals after high flow events, which occur during the first fall/winter/spring after project completion including the following parameters:

i. Assess the following parameters:

(1) Headcutting below the natural stream gradient.

(2) Substrate embeddedness in the culvert.
(3) Scour at the culvert outlet
(4) Erosion from sites associated with project construction

ii. Take remedial action where headcutting, degradation of embedded substrate, and a scour pool at the outlet, indicate that stream simulation goals have not been met.

c. Photo documentation. Photo documentation of habitat conditions at the project site before, during, and after project completion, including general views and close-ups showing details of the project and project area, including pre- and post-construction, for habitat improvement activities.

d. Pollution and Erosion Control Plan. A summary of pollution and erosion control inspections, including any erosion control failures, contaminant releases, and correction efforts.

e. Site restoration. Assess site restoration elements for an appropriate period of time to confirm that the goals, objectives, and performance standards identified in restoration plan are achieved, or if not take appropriate steps to correct the situation.

f. Annual monitoring report. Provide NOAA Fisheries with an annual monitoring report by January 31 of each year that describes the FS's efforts in carrying out the activities covered by this Opinion. The report will summarize project level monitoring information by activity and by 5^{th} field HUC. The report will also provide an overall assessment of program activity (*e.g.*, number of miles of habitat reopened, effectiveness of erosion control methods, number of fish salvaged and killed, effectiveness of site restoration activities). A copy of the annual report will be submitted to both the Oregon and Washington Offices of NOAA Fisheries.

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g. Annual Program Field Review. Coordinate a meeting with FWS and NOAA Fisheries by May 31 each year to discuss the annual monitoring report, and specifically evaluate at least six selected projects.

i. For each selected project, the project details and documentation prepared by the IDT will be provided to field review participants.

ii. For each project reviewed the project design, implementation and construction will be reviewed to determine if objectives were met, what problems were identified, and what could be done differently.

3. MAGNUSON-STEVENS ACT

3.1 Background

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance essential fish habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

- NOAA Fisheries must provide conservation recommendations for any Federal or state action that would adversely affect EFH (§305(b)(4)(A)).

- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NOAA Fisheries EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

EFH consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of EFH

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: Chinook (*O. tshawytscha*), coho (*O. kisutch*), and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed action and action area are detailed above in section 1.2 of this Opinion. The action area includes habitats that have been designated as EFH for various life-history stages of chinook, coho, and pink salmon**.**

3.4 Effects of Proposed Action

As described in detail in section 2.1.3 of this Opinion, the proposed action may result in short- and long-term adverse effects to a variety of habitat parameters. These adverse effects are:

1. Short-term increases in suspended sediments during construction.
2. Short-term disturbance to streambed substrate.
3. Short-term disturbance to riparian areas.
4. Long-term channelization of stream.

3.5 Conclusion

NOAA Fisheries concludes that the proposed action will adversely affect designated EFH for chinook, coho, and pink salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the FS, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. However, the terms and conditions outlined in section 2.2.3 are generally applicable to designated EFH for chinook, coho, and pink salmon and address these adverse effects. Consequently, NOAA Fisheries recommends that they be adopted as EFH conservation measures.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(j), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The FS must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(k)).

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